



# ELECTRIC JANE

Marywood University  
Attached Housing AH

## Project Summary

Many people know of Scranton as the home of *The Office*, an immensely popular television comedy. More recently, Scranton made headlines as President Joe Biden's "working-class" birthplace. Built above a dense network of coal mines, Scranton is also known as "The Electric City" for its early adoption and wide-spread implementation of electric street lights and street cars powered by the local mining industry. Like many so-called "rust belt" cities, with the collapse of local mining and manufacturing activities, income and populations have declined steadily in the last century from 143,443 in 1930 to 76,089 in 2010. Vacant buildings have been torn down leaving neighborhoods dotted with ecologically and socially detrimental surface parking lots. Gritty, tough, and funny, Scranton also gave birth to tenacious urban activist Jane Jacobs, who, through her influential protests and widely-read books, such as *The Death and Life of Great American Cities* (1961), transformed prevailing attitudes about urban renewal shifting the focus from large scale developments to what works for city-dwellers – small, diverse neighborhoods, front porches, eyes on the street. It is our intention is to revitalize Scranton's residential neighborhoods by infilling vacant lots with affordable, net-zero energy townhouses that integrate Passive House principles for energy efficiency, positively impact the blighted flora and fauna of Scranton, Pennsylvania, and provide desirable, safe, functional, and healthy homes that sustain families who will build vibrant communities.



## Design Strategy

Working in partnership with two local Habitat for Humanity groups – Endless Mountains (EM) and Wyoming Valley (WV) – as well as architects, engineers, and specialists, we created the Electric Jane as an affordable, durable, functional, and attractive home. Understanding the strengths, opportunities, and challenges facing local families, local community, local flora and fauna, and local renewable energy and material resources, the Electric Jane can be adapted to the distinct qualities of each location, especially other similar rust-belt cities, but is particular to the Lackawanna River valley, where the environmental degradation of the dirty coal electricity of the past can be turned into clean, power with PVs and geothermal heating and cooling of the future.

### Project Data

- Scranton, Pennsylvania | Zone 5A Cool, Humid
- 6 Janes on a 17,351 ft<sup>2</sup> site = 2,892 ft<sup>2</sup> lot/unit
- 1 Jane end unit = worst case scenario
- 1 Jane end unit = 3 bedrooms, 1.5 bathrooms; 1,743 ft<sup>2</sup>/unit gross; \$139,723.72 (\$80.19/ft<sup>2</sup>)
- PHIUS+ Source Zero design standards
- HERS Index (end unit) = 9 (with PV), 25 (w/o PV)
- DOE ZERH (end unit) = qualified
- EnergyStar (end unit) = 65
- US EPA Indoor airPLUS Label = qualified

### Technical Specifications

- Annual heating demand 7.3 kBtu/ft<sup>2</sup>yr; Annual cooling demand 6.6 kBtu/ft<sup>2</sup>yr; assuming 4 occupants
- R-55 (wall); R-30 (slab); R-80 (roof)
- U-value (whole-window) = 0.16 Btu/h.ft<sup>2</sup>.F
- Energy Recovery Ventilation = 11 fresh-air exchanges/hour
- Ground Source Heating/ Cooling (2 open loop vertical wells per unit in flooded coal mines)
- 10 Rooftop PV Panels = 5,110kWh/year

# Project Highlights

**ARCHITECTURE:** To create the Electric Jane, our Architecture strategy is to produce an affordable, attached housing prototype for Scranton that brings together the vital urban principles set forth by Jacobs (safety, diversity, functionality, local aesthetics/materials, and access to gardens/parks) with the objectives of PHIUS+ Source Zero (energy efficiency, net-zero energy, comfort, and affordability).

**ENGINEERING:** In response to Scranton's solar potential, cool climate, average precipitation, and location within the northern watershed of the Chesapeake Bay, our Engineering strategy focuses on the overall, affordable integration of passive design strategies with conservative environmental systems that collect and, where applicable, store and reuse natural resources onsite. The Electric Jane will achieve PHIUS+ Source Zero certification with a healthy thermal envelope – highly insulative foundation, wall, and roof assemblies using the Build SMART prefabricated system, delivered to site, quickly erected, and finished by local volunteers.

**MARKET ANALYSIS:** Partnering with Habitat for Humanity (HfH), our target market is defined by potential homebuyers who are in need of safe, healthy, and affordable housing, are willing to contribute their own 'sweat equity' in the construction of their home, and are financially able to make affordable monthly payments on a 35-year, 0-interest HfH mortgage. Therefore, our Market Analysis strategy is to provide this homeowner with higher quality – materials selections, environmental and renewable energy systems – for a lower monthly financial burden – mortgage and utility bills.

**DURABILITY AND RESILIENCE:** A larger upfront investment in materials and thoughtful detailing will increase the quality of the building enclosure, its Durability and Resilience, as well as integrating dynamic renewable energy and environmental systems that are capable of withstanding weather events and subsequent temporary electrical grid disruptions. The Electric Jane incorporates local reclaimed materials as well as regionally sourced new material assemblies that benefit the inhabitants, community, and environment, in regard to the lifespan, replacement details, and the economic impacts of each design decision.

**EMBODIED ENVIRONMENTAL IMPACT:** The Electric Jane is also a conscientious investment in the environment by replacing surface parking lots with modest houses, gardens and parks with large shade trees and further minimizing the Embodied Environmental Impact of source materials, delivery and construction methods, operations, and maintenance with a grade-A lifecycle carbon assessment.

**INTEGRATED PERFORMANCE:** The advantages of sunlight, rainwater, gentle breezes, and subterranean thermal mass will combine to alleviate the homeowners' 'rain tax' burden, reduce their water/sewer utility bills, and eliminate their electric utility bills using Pennsylvania Power and Light's (PPL) net-metered energy credits with annual cash payout. 100% water, 100% energy, 100% natural, 100% comfort. To achieve these goals in a systematic, efficient, and affordable manner, every aspect of the design will be optimized for Integrated Performance enhancing synergies between passive design strategies, lighting, and space conditioning systems.

**OCCUPANT EXPERIENCE:** Reclaimed and recycled materials will be used throughout the building, park, and landscape. Providing healthy and safe environments forms the foundation of the Occupant Experience by delivering ample, well-lit, and comfortable spaces for family interactions as well as personal spaces for individual activities. Inside and outside living rooms, front and back porches, and community playgrounds will provide the highest quality setting for the life of each family and the surrounding community.

**COMFORT AND ENVIRONMENTAL QUALITY:** Automated and interactive control systems will optimize energy savings within unique, customizable comfort parameter settings and will alert the homeowners when minimal, routine maintenance is required ensuring that these systems continue to perform well over time. As such, the Electric Jane will improve the homeowners' quality of life, family experience, and financial obligations leading to both psychological and physical Comfort and Environmental Quality while producing monthly savings on electricity, carbon, and water.

**ENERGY PERFORMANCE:** The Electric Jane's Energy Performance – PHIUS+ Source Zero certifiable – and environmental, comfort, and experience goals will be met without increasing the average monthly financial burden. Affordability is the most consequential aspect of this attached housing design, exerting an outsized influence on the aforementioned strategies. Therefore, the Electric Jane will produce more electricity than its annual energy needs, to cover monthly service costs and fees of the local net-metered program. An interactive, real-time monitoring system will track and share environmental and performance data.